BLUE TECHNIX

Hardware User Manual

DEV-BF548-Lite
DEV-BF548DA-Lite
Board V1.1

Tinyboards from Bluetechnix
www.bluetechnix.com

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Table of Contents

Packing List

The DEV-BF548DA-Lite and the DEV-BF548-Lite Board Package contain the following items:

1. DEV-BF548DA-Lite or DEV-BF548-Lite Board

2. 1x USB Cable (USB A/B)

3. 1x USB Cable (USB A/B) (DEV-BF548DA-Lite only)

4. 1x USB Cable (USB A/Mini USB)

5. 1x Ethernet Cable

6. 1x Power Supply.

7. Support CD

Note: The Core Modules are not shipped with the board, so you must order them separately.

Information
For further information on technology, delivery terms and conditions and prices please contact Bluetechnix (http://www.bluetechnix.com).

Warnings
Due to technical requirements components may contain dangerous substances.

The Core Modules and development systems contain ESD (electrostatic discharge) sensitive devices. Electro-static charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Unused Core Modules and Development Boards should be stored in the protective shipping package.

BLACKFIN Products

Core Modules:

CM-BF533:   Blackfin Processor Module powered by Analog Devices single core ADSP-BF533 processor; up to 600MHz, 32MB RAM, 2MB Flash, 120 pin expansion connector and a size of 36.5x31.5mm

CM-BF537E: Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 600MHz, 32MB RAM, 4MB Flash, integrated TP10/100 Ethernet physical transceiver, 120 pin expansion connector and a size of 36.5x31.5mm

CM-BF537U: Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 600MHz, 32MB RAM, 4MB Flash, integrated USB 2.0 Device, 120 pin expansion connector and a size of 36.5x31.5mm (will be replaced by CM-BF527).

TCM-BF537:   Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 500MHz, 32MB RAM, 8MB Flash, 28x28mm, 120 pin expansion connector, Ball Grid Array or Border Pads for reflow soldering, industrial temperature range -40°C to +85°C.

CM-BF561:   Blackfin Processor Module powered by Analog Devices dual core ADSP-BF561 processor; up to 2x 600MHz, 64MB RAM, 8MB Flash, 120 pin expansion connector and a size of 36.5x31.5mm.

CM-BF527:   The new Blackfin Processor Module is powered by Analog Devices single core ADSP-BF527 processor; key features are USB OTG 2.0 and Ethernet. The 2x60 pin expansion connectors are backwards compatible with other Core Modules.

CM-BF548:   The new Blackfin Processor Module is powered by Analog Devices single core ADSP-BF548 processor; key features are 64MB DDR SD-RAM 2x100 pin expansion connectors.

Development Boards:

EVAL-BF5xx: Low cost Blackfin processor Evaluation Board with one socket for any Bluetechnix Blackfin Core Module. Additional peripherals are available, such as an SD-Card.

DEV-BF5xxDA-Lite: Get ready to program and debug Bluetechnix Core Modules with this tiny development platform including a USB Based Debug Agent. The DEV-BF5xxDA-Lite is a low cost starter development system including VDSP++ Evaluation Software License.

DEV-BF5xx-FPGA:	Blackfin Development Board with two sockets for any combination of Blackfin Core Modules. Additional peripherals are available, such as SD-Card, Ethernet, USB host, multi-port JTAG including a USB based Debug Agent, connector for an LCD-TFT Display and connector for a digital camera system. A large on-board SPARTAN-3 FPGA and Soft IPs make this board the most flexible Blackfin development platforms ever developed.
DEV-BF548DA-Lite:	Get ready to program and debug Bluetechnix CM-BF548 Core Module with this tiny development platform including a USB Based Debug Agent. The DEV-BF548DA-Lite is a low cost starter development system including VDSP++ Evaluation Software License.
EXT-Boards:	The following Extender Boards are available: EXT-BF5xx-Audio, EXT-BF5xx-Video, EXT-BF5xx-Camera, EXT-BF5xx-Exp, EXT-BF5xx-ETH-USB, EXT-BF5xx-AD/DA. Additional boards based on customer request are also available.

Software Support:

BLACKSheep:	The BLACKSheep VDK is a multithreaded framework for the Blackfin processor family from Analog Devices that includes driver support for a variety of hardware extensions. It is based on the real-time VDK kernel included within the VDSP++ development environment.
LabVIEW:	LabVIEW embedded support for the CM-BF537E, CM-BF537U and TCM-BF537 Core Modules is based upon the BLACKSheep VDK driver Framework.
uClinux:	All the Core Modules are fully supported by uClinux. The required boot loader and uClinux can be downloaded from: http://blackfin.uClinux.org.

Upcoming Products and Software Releases:

Keep up-to-date with all the changes to the Bluetechnix product line and software updates at: www.bluetechnix.com

BLACKFIN Design Service

Based on more than five years of experience with Blackfin, Bluetechnix offers development assistance as well as custom design services and software development.

1 Introduction

NOTE: The DEV-BF548DA-Lite has an on-board Debug Agent, which is not available on the DEV-BF548-Lite Board. All other features are identical! In this document, when describing both boards, the name DEV-BF548-Lite is used.

The DEV-BF548-Lite Development Board with integrated Debug Agent is designed as a development and application board for the high performance ADSP-BF548 based CM-BF548 Core Module. Special feature of the board is the 10/100Mbit industrial Ethernet controller. The integrated Debug Agent is a USB based debug interface which enables programming and debugging of the Blackfin Core Modules. It is fully compatible with the Visual DSP++ development environment. The development board provides all interfaces on dedicated connectors or expansion connectors. Extender boards can be plugged on top of the Development Board in order to enable additional interfaces.

1.1 Overview

The DEV-BF548-Lite Board includes the following components:
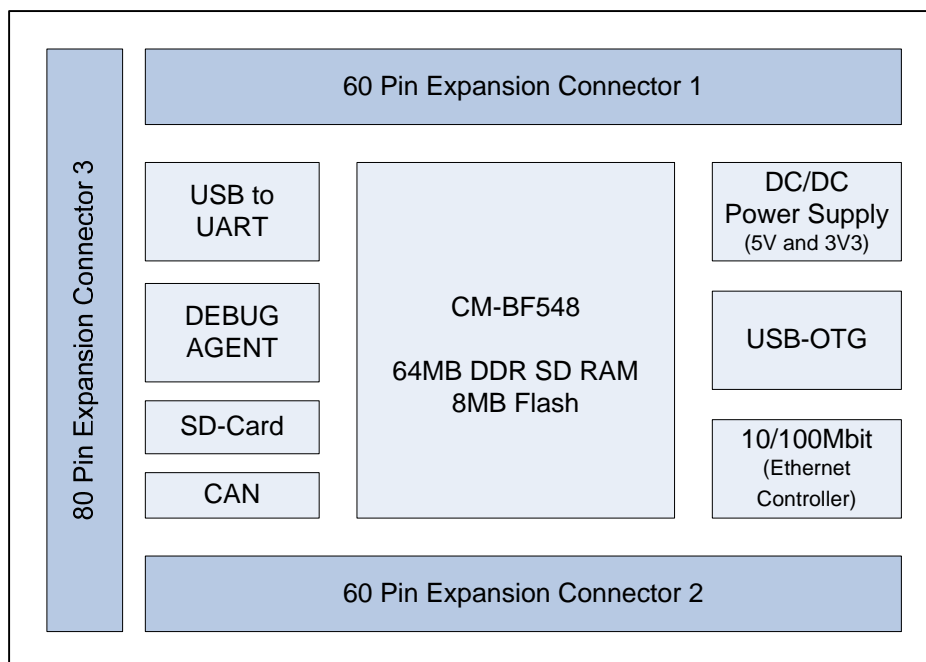
Figure 1-1: Overview of the DEV-BF548-Lite Board

- **DC/DC Converters**

    o 5V@2A

    o 3V3@1.5A (draws its power from the 5V output of the DC/DC)

- **1 Core Module Slot**

    o Supports the CM-BF548 Core Module

- **USB-to-UART Port**

- o Supports up to 915kbps UART-USB conversion.

- o Emulates a standard COM port on the computer.

- o Drivers for Windows and Linux available

- **JTAG**

  - o JTAG-Plug that supports all analog Devices JTAG Emulators.

- **Expansion Connector 1 (X1)**

  - o Data Bus

  - o Address Bus

  - o Memory Control

  - o RESET

  - o PPI0 (Parallel Port Interface 0)

  - o GPIO (Programmable)

  - o Power Supply

- **Expansion Connector 2 (X2)**

  - o PPI1 (Parallel Port Interface 1), SPORT1

  - o Power Supply (Main Supply Connector)

  - o GPIO (Programmable)

  - o UART0

  - o SPI2

- **Expansion Connector 3 (X3)**

  - o ATAPI Interface

  - o SPI0, SPI1

  - o SPORT2, SPORT3

  - o CAN 0, CAN1

  - o UART2, UART3

  - o PPI0 (Sync, D16,D17))

  - o SDIO Interface

  - o GPIO (Programmable)

- **USB2.0 OTG Connector**

  - Uses the On-Board USB-OTG transceiver

- **RJ-45 Ethernet Plug**

  - Connected to the On-Board SMSC LAN9218 Ethernet Controller

- **External Power Supply**

  - The board is shipped with a 12V, 2A external DC/DC Power Supply
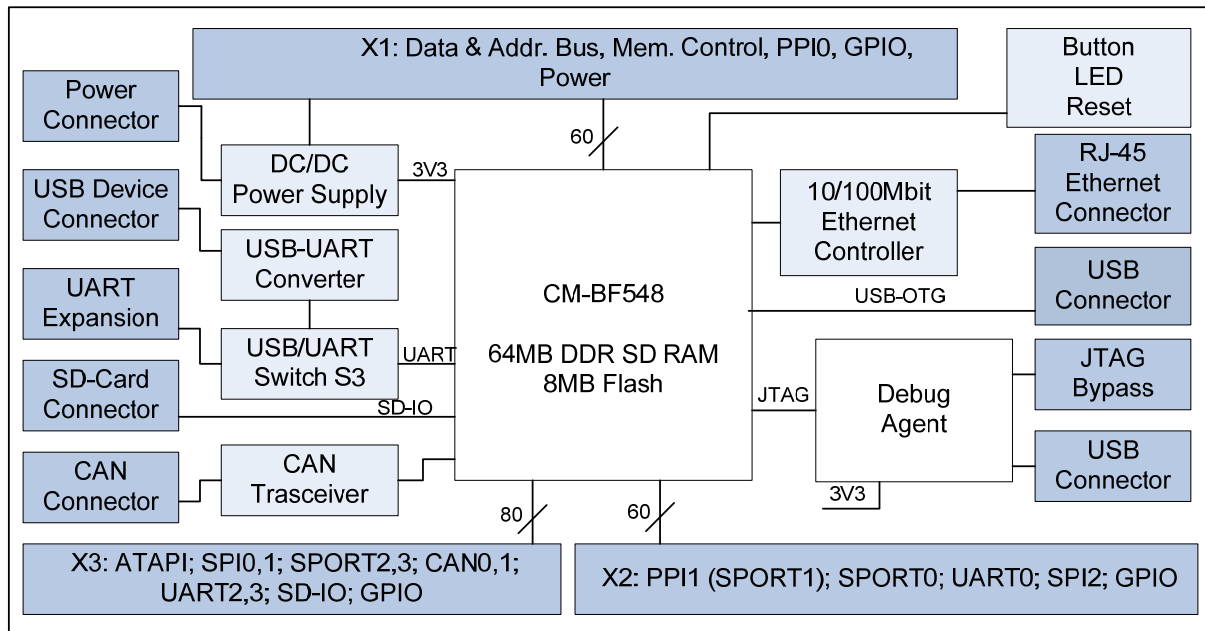
2 Functional Specification

Figure 2-1: Functional Block Diagram

Power connector and Power supply:

The supplied power supply should be used. It can deliver up to 2A at 12V.
The input voltage range of an alternative power supply must be between 6-16V!
The on-board DC/DC power supply generates 5V and 3.3V which are made available at the expansion connectors.
The maximum current that can be drawn from the 5V is 2A, but take care this includes the current going into the 3.3V regulator also, because this regulator is powered by the 5V. The maximum current that can be drawn from the 3.3V is 1.5A but note that this means at least 1A additional load on the 5V connector.

The serial Port 0 (UART0, default Console IO) or Port1 (UART1) of the Core Module can be routed directly to the *USB Port* (USB/UART Switch (S3).

An *Ethernet controller (SMSC LAN9218)* is connected to the data and address bus on the baseboard providing a high speed 10/100MBit LAN Interface

An *SD-Card connector* is mounted on the board and is connected to the processors SD-IO Interface. With the SD-Card one can make use of file IO Functions delivered with the BLACKSheep Software. BLACKSheep supports SD-Cards and includes a FAT file system as well as the most relevant File IO Functions. The complete BLACKSheep software package can be purchased from Bluetechnix.

The *USB2.0 OTG connector* interfaces with the processors on-chip (ADSP-BF548) USB Transceiver.

3 PCB Placement and Mechanical Outline

3.1 PCB Placement
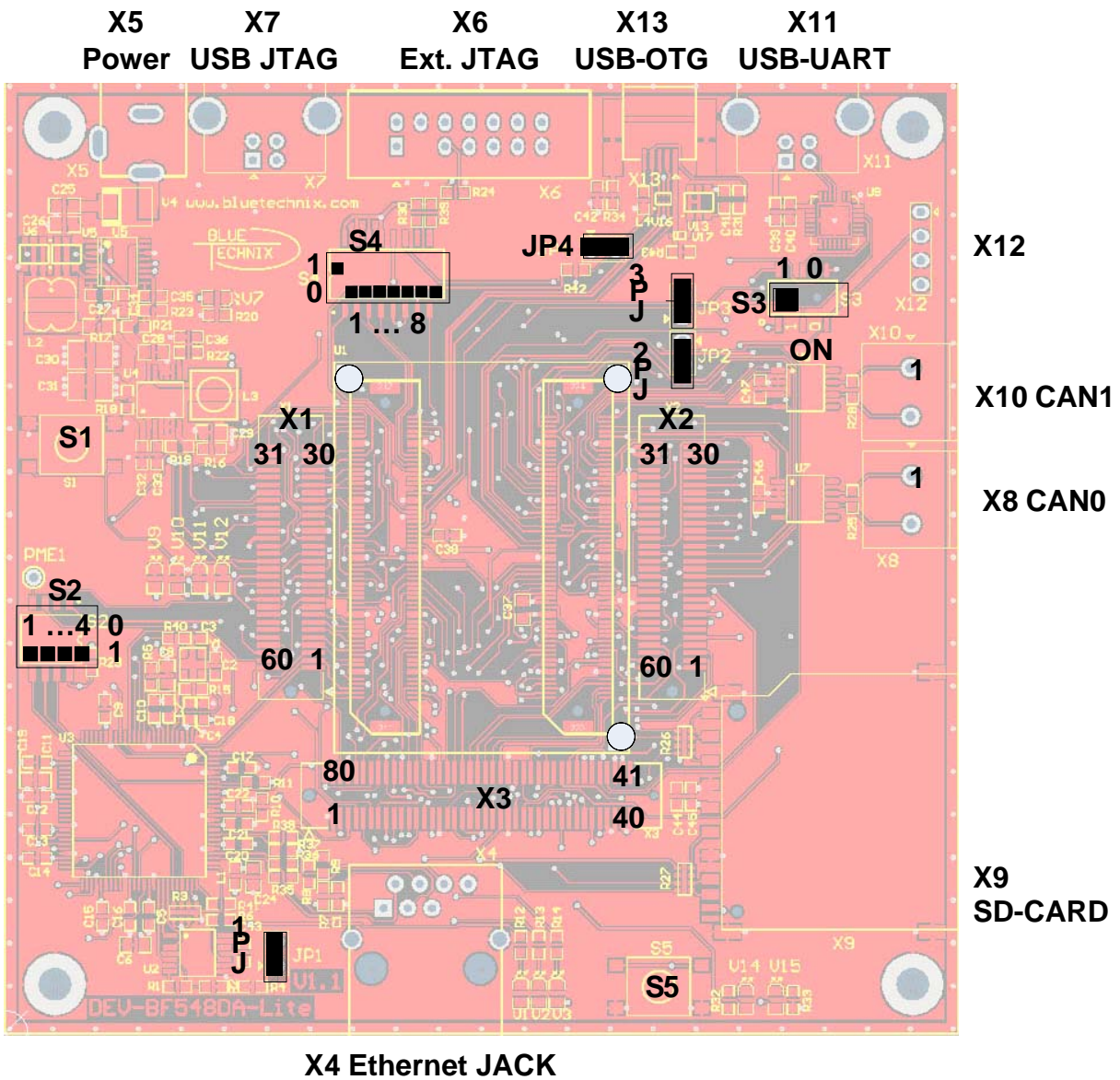
Figure 3-1: Connector PCB Placement

ATTENTION: Please mind the direction while inserting the Core Module!

3.2 Mechanical Outline

Figure 3-2: Mechanical Outline – Expansion Connector Placement

3.3 Extension Board Footprint

If you want to design your own Extension Board for the DEV-BF548, you can use the following Board dimensions. The mating Connectors in Figure 3-3 are mounted on top.
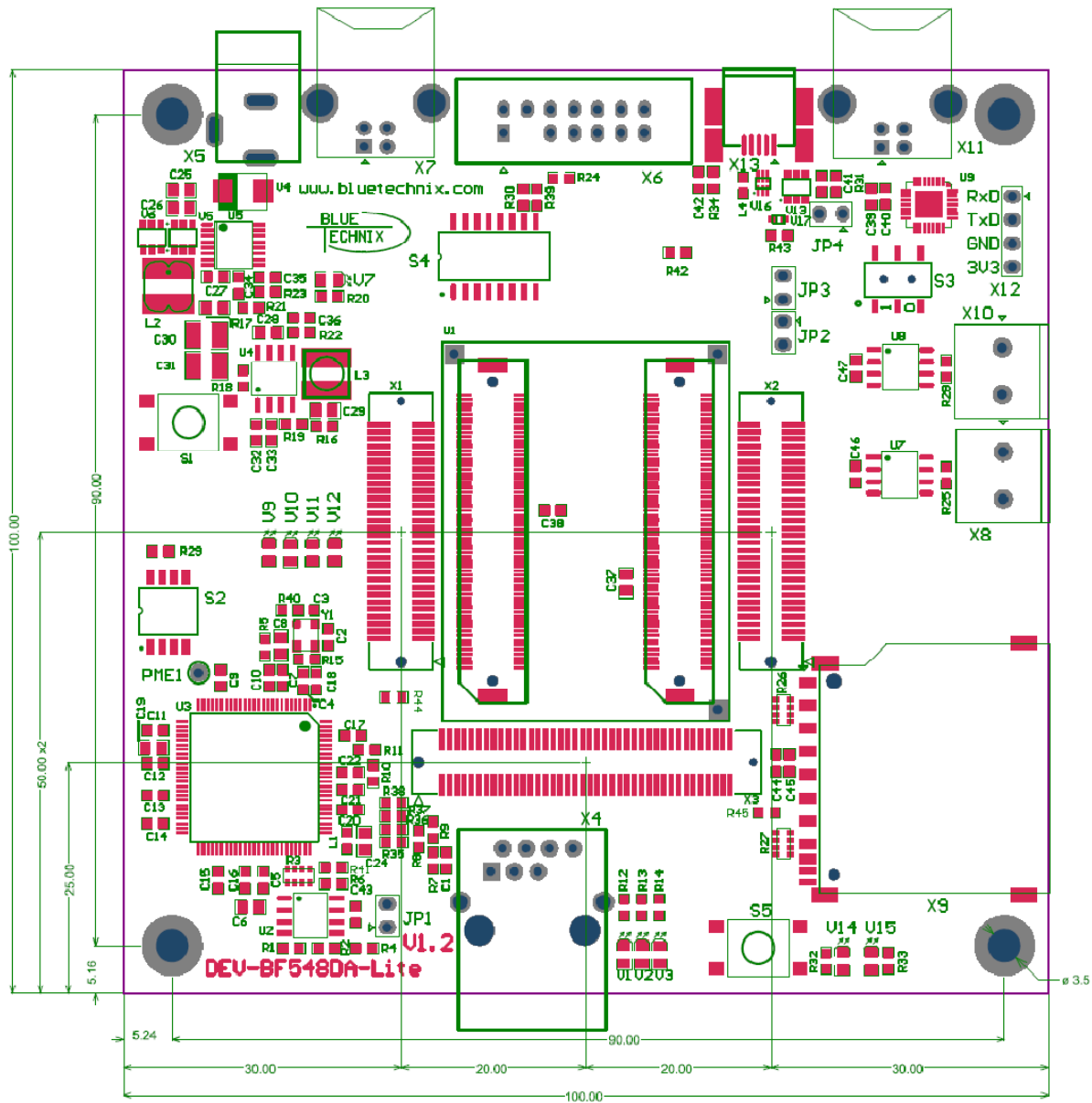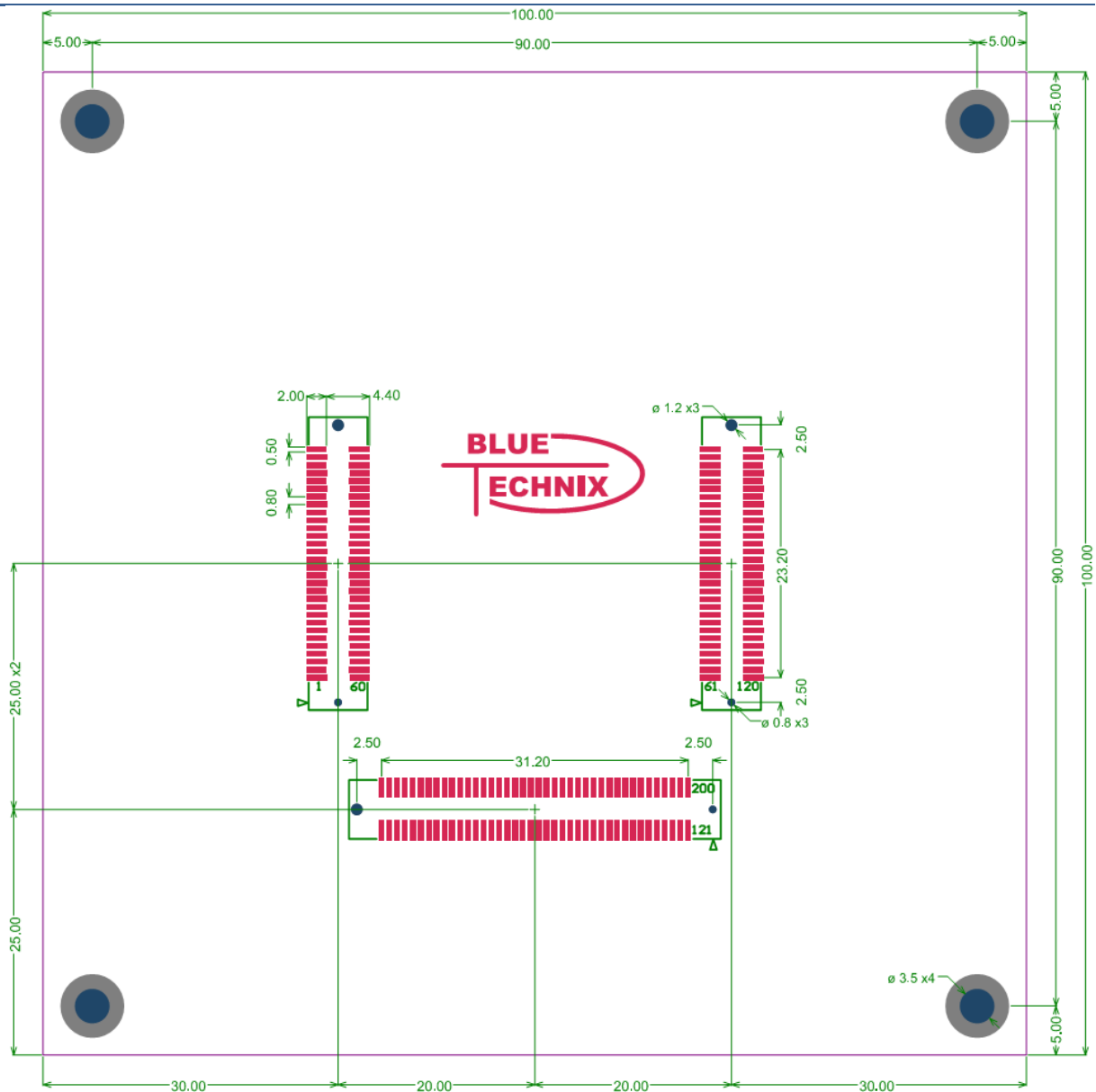
Figure 3-3: Recommended Footprint for Extension Boards – **top view**

4 Connector Description

4.1 X4 –RJ45 Ethernet Connector

Pin No.	Signal (Core Module)	IO-Type
1	TX+	O
2	TX-	O
3	RX+	I
4	NC	-
5	NC	-
6	RX-	I
7	NC	-
8	NC	-

Table 4-1: Ethernet Connector

4.2 X9 –SD-Card Connector (bottom Mount)

Pin No.	Signal (Core Module)	Description (SD Card)
0	SD_D2	DAT2
1	SD_D3	CD/DAT3
2	SD_CMD	CMD
3	GND	VSS1
4	3,3V	VDD
5	SD_CLK	CLK
6	GND	VSS2
7	SD_D0	DAT0
8	SD_D1	DAT1
9	-	CD
10	-	WP

Table 4-2: SD-Card Connector

4.3 X6 – JTAG Bypass Connector

The JTAG connector is compliant with any Blackfin JTAG Emulator from Analog Devices. When an external JTAG emulator is attached the on-board JTAG is bypassed and the external one is automatically used.

4.4 X11 – USB-UART Connectors

Connects either UART0 (when S3 is in Pos 1) or UART1 (when S3 is in Pos 0) to the USB Interface enabling a COM Port on the PC. UART0 is standard console IO for the BLACKSheep Software.

4.5 X12 UART Expansion Pads

When S3 is in position 1 the UART1 on PortH (TX, RX) is available on the expansion pins and disconnected from the USB-UART Chip.

Pin No.	Signal	Signal Type
1	TxD Blackfin	Input Core Module
2	RxD Blackfin	Output Core Module
3	GND	
4	3V3	Regulated Power

Table 4-3: UART1 additional Header

4.6 X1, X2, X3 Expansion Connectors

The Expansion Connectors on the DEV-BF548-Lite for a Stacked Height of 16mm are of the following type:

Part	Manufacturer	Manufacturer Part Nr.
X1, X2	AMP (Stacked Height = 16mm)	5-5179010-2
Matching connector	AMP	5179031-2
X3	AMP (Stacked Height = 16mm)	5-5179010-3
Matching connector	AMP	5179031-3

Table 4-4: DEV-board connector types

The matching connector, which is used for building an extender board, can be ordered from Bluetechnix.

4.7 X8, X10 – CAN1, CAN0 Connector

Pin No.	Signal (Core Module)	IO-Type
1	CAN+	I/O
2	CAN-	I/O

Table 4-5: CAN Connector

4.8 X5 – Power Connector

The board is shipped with a 12V, 2A external DC/DC Power Supply which should be used.

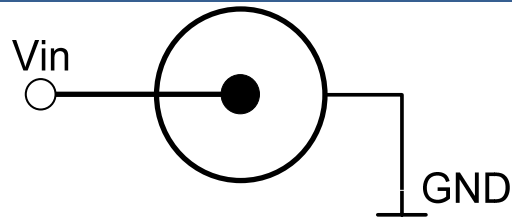| Pin No.	Signal	Description
1	Vin (+6V to +16V DC) Input Supply	Preferable 12V DC (2A)
2	NC	
3	GND	

Table 4-6: Power Supply

Figure 4-1: Power connector

To connect to X141 use a "DCPP1" e.g. from Cliff Electronic Components (2.1mm * 5.5mm * 9.5mm) plug to the power supply. Outer contact is GND, inner contact is VCC.

4.9 Expansion Connectors

The interface to the extender boards is grouped into three different connectors (X1, X2, X3). The three tables below shows the pin out of these three connectors. The column "Pin No. (Connector)" shows the pin number of each connector, while the column "Pin No. (Symbol)" shows the pin number of the extension connector schematic symbol, where the pins are numbered from 1 to 200. The column "Pin No. CM" represents the pin number of the corresponding signal on the Core Module.

4.9.1 X2 – Expansion Connector 2

Pin No. (Symbol)	Pin No. (Connector)	Signal	Signal type	Pin No CM
1	1	PC7	I/O	93
2	2	PC6	I/O	94
3	3	PC3	I/O	97
4	4	PC2	I/O	98
5	5	CLKOUT	O	70
6	6	PE15	I/O	185
7	7	PA13	I/O	114
8	8	PA5	I/O	106
9	9	3.3V	PWR	
10	10	3.3V	PWR	
11	11	PD0	I/O	135
12	12	PD2	I/O	137
13	13	PD4	I/O	139
14	14	PD6	I/O	141
15	15	PD8	I/O	143
16	16	PD10	I/O	145
17	17	PD12	I/O	147
18	18	PD14	I/O	149
19	19	PH0	I/O	22
20	20	PE12	I/O	188
21	21	PB11	I/O	130
22	22	PB9	I/O	128
23	23	PE8	I/O	192
24	24	PB13	I/O	132
25	25	PB12	I/O	131
26	26	PH1	I/O	23

27	27	nARDY	I	21
28	28	PH4	I/O	26
29	29	5.0V *)	PWR	
30	30	5.0V ^{2})	PWR	
31	31	Vin ^{3})	PWR	
32	32	Vin ^{3})	PWR	
33	33	PH7	I/O	29
34	34	nAMS3	O	32
35	35	nABE1	O	17
36	36	nABE0	O	16
37	37	PB14	I/O	133
38	38	PE7	I/O	193
39	39	PB8	I/O	127
40	40	PB10	I/O	129
41	41	PE11	I/O	189
42	42	PE13	I/O	187
43	43	PD15	I/O	150
44	44	PD13	I/O	148
45	45	PD11	I/O	146
46	46	PD9	I/O	144
47	47	PD7	I/O	142
48	48	PD5	I/O	140
49	49	PD3	I/O	138
50	50	PD1	I/O	136
51	51	GND	PWR	
52	52	GND	PWR	
53	53	PA1	I/O	102
54	54	PA9	I/O	110
55	55	PH3	I/O	25
56	56	PE14	I/O	186
57	57	PC1	I/O	99
58	58	PC0	I/O	100
59	59	PC5	I/O	95
60	60	PC4	I/O	96

4-7 Expansion Connector X2

1) Maximum current carrying capacity: **1A**.

2) Pin 29 and 30 of the X8 connector are +5V stabilized from the DC/DC that can be used for custom add-on boards or the extender boards. Maximum current carrying capacity: **900mA**.(**Attention:** If Core Modules with USB in host mode are used, the current must be shared with the connected USB device.

3) Pin 31 and 32 of the X7 are Vin of the external power supply minus the input protection diode voltage. These pins can be used for custom add-on board power supplies. Maximum current carrying capacity: **1A**.

4.9.2 X1 – Expansion Connector 1

Pin No. (Symbol)	Pin No. (Connector)	Signal	Signal type	Pin No CM
61	1	A1	O	1
62	2	A3	O	3
63	3	A5	O	5
64	4	A7	O	7
65	5	A9	O	9
66	6	A11	O	11
67	7	A13	O	13
68	8	A15	O	15
69	9	PG1	I/O	165
70	10	PG2	I/O	164
71	11	PF1	I/O	181
72	12	PF3	I/O	179
73	13	PF5	I/O	177
74	14	PF7	I/O	175
75	15	PF9	I/O	173
76	16	PF11	I/O	171
77	17	PF13	I/O	169
78	18	PF15	I/O	167
79	19	GND	PWR	
80	20	nAMS1	O	30
81	21	nAWE	O	20
82	22	nNMI	I	34
83	23	D0	I/O	35
84	24	D2	I/O	37
85	25	D4	I/O	39
86	26	D6	I/O	41
87	27	D8	I/O	43
88	28	D10	I/O	45
89	29	D12	I/O	47
90	30	D14	I/O	49
91	31	D15	I/O	50
92	32	D13	I/O	48
93	33	D11	I/O	46
94	34	D9	I/O	44
95	35	D7	I/O	42
96	36	D5	I/O	40
97	37	D3	I/O	38
98	38	D1	I/O	36
99	39	nRESET	I/O	67
100	40	nAOE	O	18
101	41	nARE	O	19
102	42	nAMS2	O	31
103	43	3.3V	PWR	
104	44	PF14	I/O	168
105	45	PF12	I/O	170

106	46	PF10	I/O	172
107	47	PF8	I/O	174
108	48	PF6	I/O	176
109	49	PF4	I/O	178
110	50	PF2	I/O	180
111	51	PF0	I/O	182
112	52	PH2	I/O	24
113	53	PG0	I/O	166
114	54	A14	O	14
115	55	A12	O	12
116	56	A10	O	10
117	57	A8	O	8
118	58	A6	O	6
119	59	A4	O	4
120	60	A2	O	2

4-8 Expansion Connector X1

4.9.3 X3 – Expansion Connector 3

Pin No. (Symbol)	Pin No. (Connector)	Signal	Signal type	Pin No CM
121	1	GND	PWR	
122	2	PJ13	I/O	74
123	3	PJ12	I/O	75
124	4	PJ11	I/O	76
125	5	PJ10	I/O	77
126	6	PJ9	I/O	78
127	7	PJ8	I/O	79
128	8	PJ7	I/O	80
129	9	PJ6	I/O	81
130	10	PJ5	I/O	82
131	11	PJ4	I/O	83
132	12	PJ3	I/O	84
133	13	PJ2	I/O	85
134	14	PJ1	I/O	86
135	15	GND	PWR	
136	16	PB0	I/O	119
137	17	PB1	I/O	120
138	18	PB2	I/O	121
139	19	PB3	I/O	122
140	20	PB4	I/O	123
141	21	PB5	I/O	124
142	22	PB6	I/O	125
143	23	PB7	I/O	126
144	24	GND	PWR	
145	25	PA0	I/O	101
146	26	PA2	I/O	103

147	27	PA3	I/O	104
148	28	PA4	I/O	105
149	29	PA6	I/O	107
150	30	PA7	I/O	108
151	31	PA8	I/O	109
152	32	PA10	I/O	111
153	33	PA11	I/O	112
154	34	PA12	I/O	113
155	35	PA14	I/O	115
156	36	PA15	I/O	116
157	37	GND	PWR	
158	38	GND	PWR	
159	39	3.3V	PWR	
160	40	3.3V	PWR	
161	41	5.0V	PWR	
162	42	Vin	PWR	
163	43	GND	PWR	
164	44	PG3	I/O	163
165	45	PG4	I/O	162
166	46	PG5	I/O	161
167	47	PG6	I/O	160
168	48	PG7	I/O	159
169	49	PG8	I/O	158
170	50	PG9	I/O	157
171	51	PG10	I/O	156
172	52	PG11	I/O	155
173	53	PG12	I/O	154
174	54	PG13	I/O	153
175	55	PG14	I/O	152
176	56	PG15	I/O	151
177	57	GND	PWR	
178	58	PE0	I/O	200
179	59	PE1	I/O	199
180	60	PE2	I/O	198
181	61	PE3	I/O	197
182	62	PE4	I/O	196
183	63	PE5	I/O	195
184	64	PE6	I/O	194
185	65	PE9	I/O	191
186	66	PE10	I/O	190
187	67	GND	PWR	
188	68	PC8	I/O	92
189	69	PC9	I/O	91
190	70	PC10	I/O	90
191	71	PC11	I/O	89
192	72	PC12	I/O	88
193	73	PC13	I/O	87
194	74	PH6	I/O	28
195	75	PH5	I/O	27

196	76	ATAPI_PDIAG	I	134
197	77	EXT_WAKEUP	O	33
198	78	GND	PWR	
199	79	CLKBUF	O	69
200	80	GND	PWR	

4-9 Expansion Connector X3

5 Switches, Jumper and LED Description

5.1 S1 – Reset switch

Performs system reset.

5.2 S2 – Ethernet Control Signals / SDCARD CS

Default Settings

Dipswitch	Function
S2.1	Connect SDCARD CS to PC5
S2.2	Connect nAMS1 from Core Module to Ethernet chip
S2.3	Connect PE6 from Core Module to Ethernet chip IRQ
S2.4	Connect PME of Ethernet chip to test point PME1

5-1 DIP switch S2

S3 – UART Switch

Move S3 to position 1 to route the Core Modules RX0 and TX0 signals to USB

Move S3 to position 0 to route the Core Modules RX1 and TX1 signals to USB

5.3 S4 – Boot Configuration

S4.1 to S4.4 Control the boot mode and are described in chapter 6 Boot Mode Description.

Dipswitch	Function
S4.1	Bootmode 0
S4.2	Bootmode 1
S4.3	Bootmode 2
S4.4	Bootmode 3
S4.5	Power Supply for CAN0 Driver IC
S4.6	Power Supply for CAN1 Driver IC
S4.7	Connect TXD-USB to VCC
S4.8	Connect S5 to VCC

5-2 DIP switch S4

5.4 JP1 – Ethernet Speed Selection

Set jumper JP1 to select Ethernet Speed 10MBit/s and unset JP1 for 100Mbit/s.

5.5 JP2 -– Power Supply Jumper

This jumper can be removed in order to insert an AMPERE METER for current measurement:

5.6 JP3 – RTC Power Jumper

This jumper is used to connect the VddRTC pin of the Core Module to 3.3V. You can also use this jumper to connect a battery to the internal RTC of the Blackfin.´

5.7 JP4 – USB ID

Short jumper JP4 to tie USB ID to GND on the USB-OTG Connector X13.

5.8 S5 - Button

The button S5 is a GPIO Button and connects to PH7.

5.9 General Purpose LEDs

Designator	Function	Blackfin GPIO
V14	GPIO LED	PH6
V15	GPIO LED	PH5

Table 5-3: Core Module LEDs

5.10 Ethernet LEDs

Designator	Color	Description
V1	Yellow	Fullduplex
V2	Green	Activity
V3	Green	100MB Speed LED

Table 5-4: Ethernet LEDs

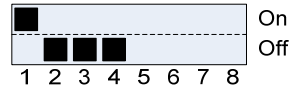## 5.11 LEDs of the Debug Agent

Designator	Color	Description
V9	Green	Flag0
V10	Green	Flag1
V11	Green	Monitor
V12	Green	Pr. done

Table 5-5: LEDs for the Debug Agent

6 Boot Mode Description

Boot-settings for CM-BF548 (S4) only Switches 1 – 4 of 8 are shown

The default Boot Mode option for the BLACKSheep Software is 0001 !
The default Boot Mode option for the uClinux / uBoot is 0001 !

BMODE3–0 (S4.4-S4.1)	Description
0000	Idle–no boot
0001	Boot from 8- or 16-bit external flash memory
0010	Boot from 16-bit asynchronous FIFO
0011	Boot from serial SPI memory (EEPROM or flash)
0100	Boot from SPI host device
0101	Boot from serial TWI memory (EEPROM/flash)
0110	Boot from TWI host
0111	Boot from UART host
1000	Reserved
1001	Reserved
1010	Boot from (DDR) SDRAM
1011	Boot from OTP memory
1100	Reserved
1101	Boot from 8- or 16-bit NAND flash memory via NFC
1110	Boot from 16-Bit Host DMA
1111	Boot from 8-Bit Host DMA

Table 6-1: Boot modes

7 Installation

7.1 Initial Board Setup

The installation guide is written for Windows (Windows 2000 and WinXP). However for connecting the USB device the driver for MAC and LINUX are available on the CD.

In order to set up und test your DEV-BF548-Lite board the following steps can be done:

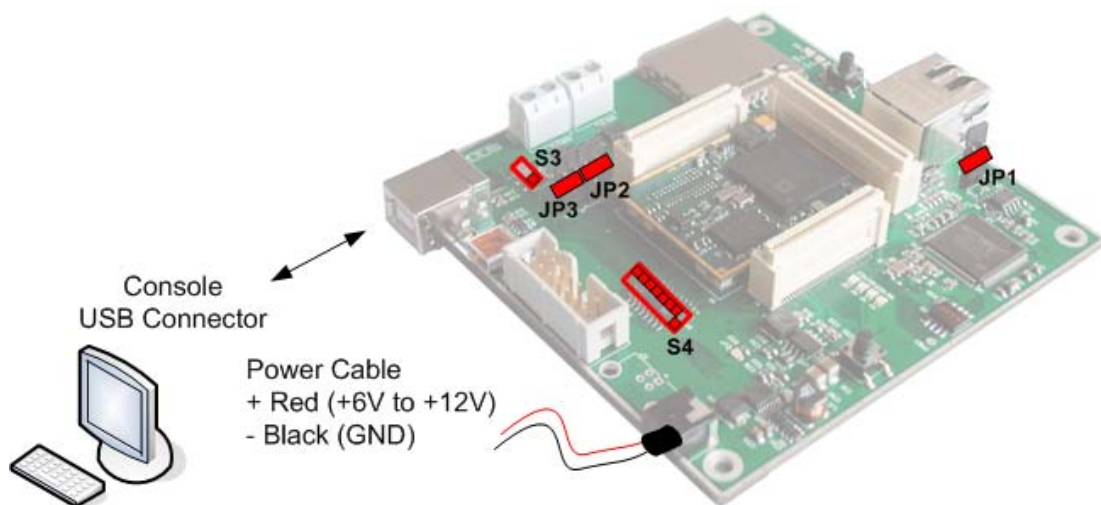1. Make sure jumpers JP2 and JP3 are set and the Switch S3 is in Position 1. as shown in Figure 7-1 (JP1 unset).


Figure 7-1: Setup of the DEV-BF548-Lite Board

2. If you want to use an SD-Card, insert the SD-Card in the appropriate slot at the bottom side of the board.

3. Connect the power supply to the power connector off the DEV-BF548-Lite board.

4. Connect the DEV-BF548-Lite Board via USB to the PC. The pre-flashed BLACKSheep starts and the LED mounted on the DEV-BF548-Lite board starts blinking. On the PC usually the 'Found New Hardware Wizard' opens.

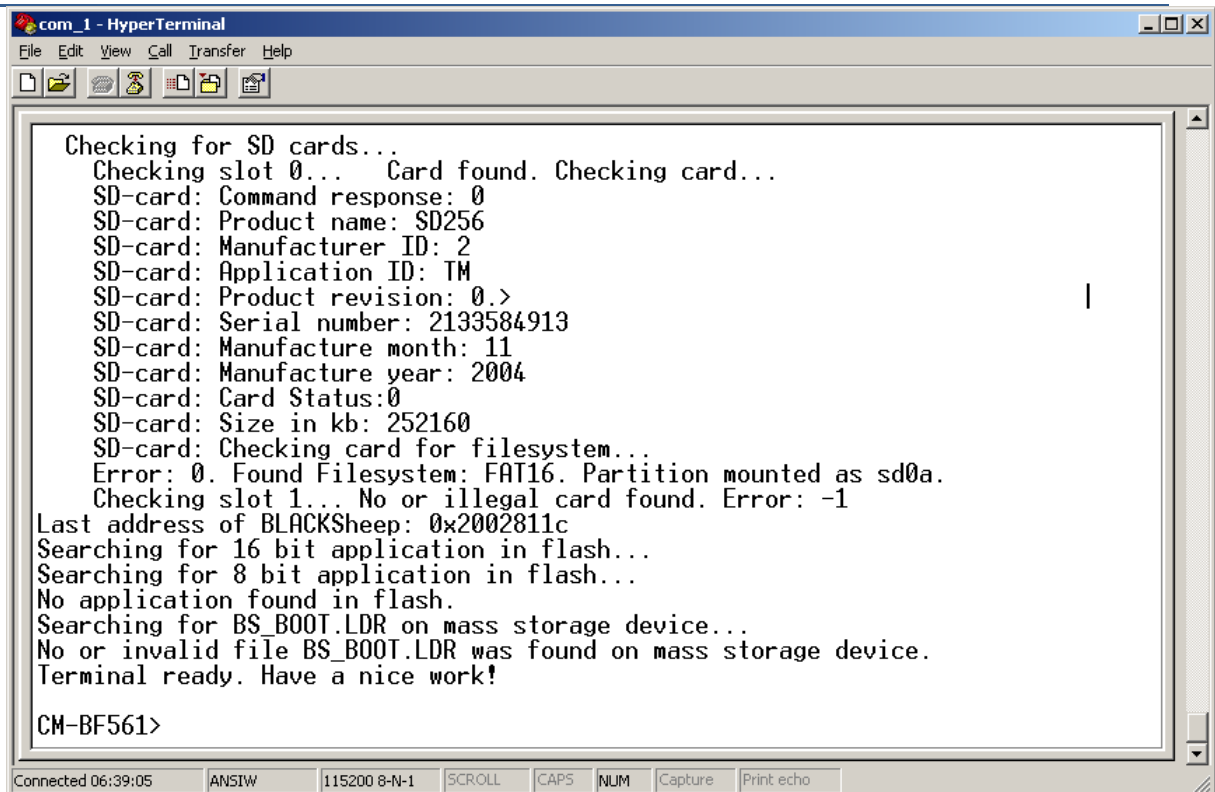If the wizard asks you to connect to the windows update site, select "No, not this time"
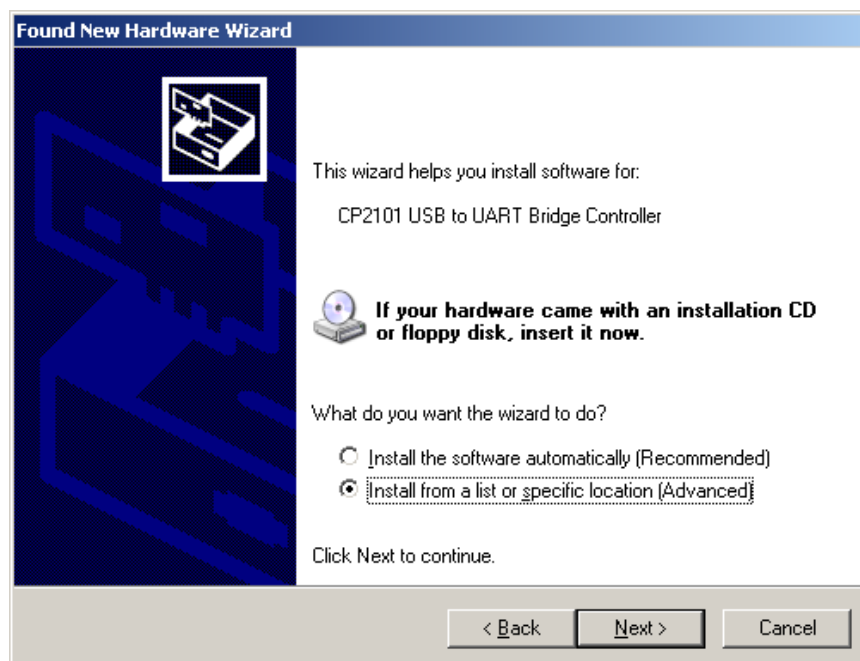
Choose: "Install from a list or specific location". The driver is located on your support CD.
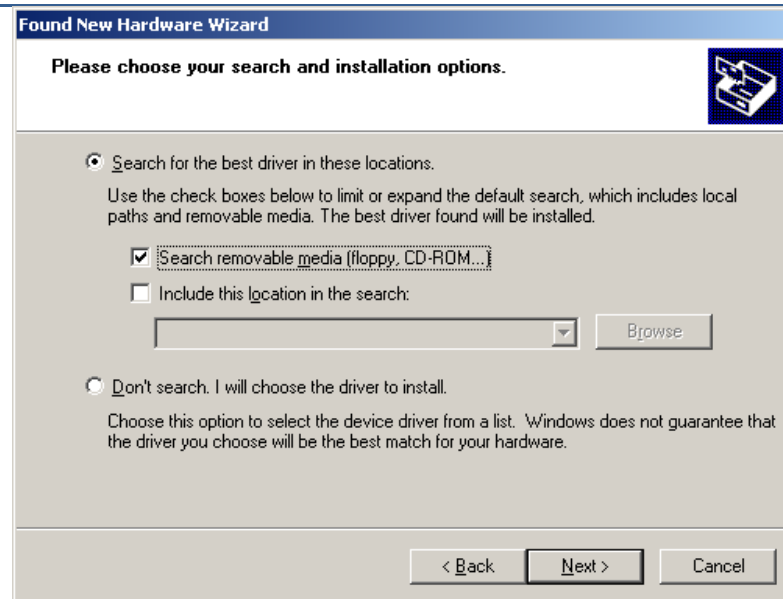
This procedure has to be done twice, because at first the USB driver will be installed. Then the Hardware Wizard opens again, because the UART bridge driver has to be installed in addition using the same driver file. Simply repeat this step.

5. Open the Windows device manager (Control Panel → System → Hardware) to see which COM port number has been assigned to the CP2101 UART-to-USB Chip. This number differs from computer to computer based on the already installed COM ports. (e.g. COM4)

6. Open a Terminal program like the HyperTerminal included in Windows operating systems and open the respective COM port with **115200 Baud, 8 Data-bits, No Parity and 1 Stop bit**, **disable the Hardware flow control**.

7. Reset the DEV-BF548-Lite Board (Press the main reset button). After this you will see the BLACKSheep boot-screen showing up. If you disconnect the device, you have to reconnect.

```
com_1 - HyperTerminal
File  Edit  View  Call  Transfer  Help

  Checking for SD cards...
    Checking slot 0...   Card found. Checking card...
    SD-card: Command response: 0
    SD-card: Product name: SD256
    SD-card: Manufacturer ID: 2
    SD-card: Application ID: TM
    SD-card: Product revision: 0.>                          |
    SD-card: Serial number: 2133584913
    SD-card: Manufacture month: 11
    SD-card: Manufacture year: 2004
    SD-card: Card Status:0
    SD-card: Size in kb: 252160
    SD-card: Checking card for filesystem...
    Error: 0. Found Filesystem: FAT16. Partition mounted as sd0a.
    Checking slot 1... No or illegal card found. Error: -1
Last address of BLACKSheep: 0x2002811c
Searching for 16 bit application in flash...
Searching for 8 bit application in flash...
No application found in flash.
Searching for BS_BOOT.LDR on mass storage device...
No or invalid file BS_BOOT.LDR was found on mass storage device.
Terminal ready. Have a nice work!

CM-BF561>

Connected 06:39:05    ANSIW    115200 8-N-1    SCROLL    CAPS    NUM    Capture    Print echo
```

This shows a sample boot screen. Depending on the current software version, you might get different boot messages.

8. You can find a simple hello world program on your support CD or at the download section of the product homepage. To start the sample program, type "*xmr UART*" on your terminal program, then (Transfer → Send file) select the appropriate file "*UART.ldr*" depending on your Core Module, choose protocol "Xmodem" and send. After the download has finished type "*exec UART*" for executing the sample program.

9. Press reset to return to the BLACKSheep command line.

7.2 Debug Agent Setup (DEV-BF548DA-Lite only)

If you have purchased a DEV-BF548DA-Lite board with the Debug Agent mounted on the bottom side of the board you can use it to download and debug your software with the VDSP++ development environment from Analog Devices. An evaluation version is included in the support CD or you can download it from our website or the website from Analog Devices. Currently the Debug Agent works only with version 4.5 of the VDSP++ IDE.

Note: The Core Module will get warm while in use.

Please follow the instructions for installing and configuring VDSP++ to work with the Debug Agent.

1. Install VDSP++4.5

2. If available install the latest update for VDSP++4.5. You can download updates from the Analog Devices website.

3. Configure VDSP++4.5 to support the DEV-BF548DA-Lite by starting the Installer from your support CD. Once started you should see the following dialog.

   Note: To run the installer the .net framework is required!

4. Select the Core Module that you have inserted in the socket of your DEV-BF548DA-Lite.

5. Press the "Install" button.

6. You should get the following message:

7. Be sure that the board is powered on!

8. Connect X4 (USB JTAG) with an USB cable to a free USB port on your PC.

9. The following dialog or a similar one should appear:

10. Choose "Install the software automatically", press "Next" and follow the instructions on the screen.

After the install process you have to create a Platform using the Platform Wizard of the VDSP++. Please follow the instructions to create a valid Platform for the Bluetechnix USB Debug Agent.

1. Open the VisualDSP++ Configurator from the start menu entry of VisualDSP++ 4.5.

2. Select "New…"

3. In the "Type" box select the Bluetechnix entry corresponding to the Core Module on your DEV-BF548DA-Lite board.

4. Enter a Name for the Platform for example "Bluetechnix CM-BF537".
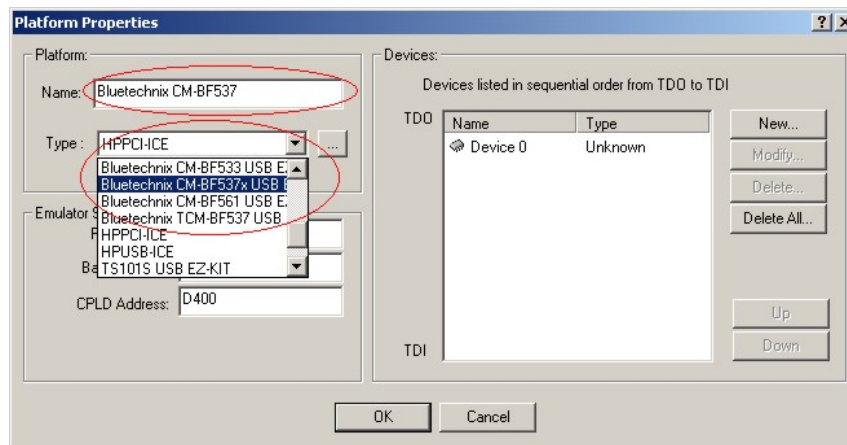
5. Select "Ok". The created platform should appear in the "Platforms" section of the "configurator" window.
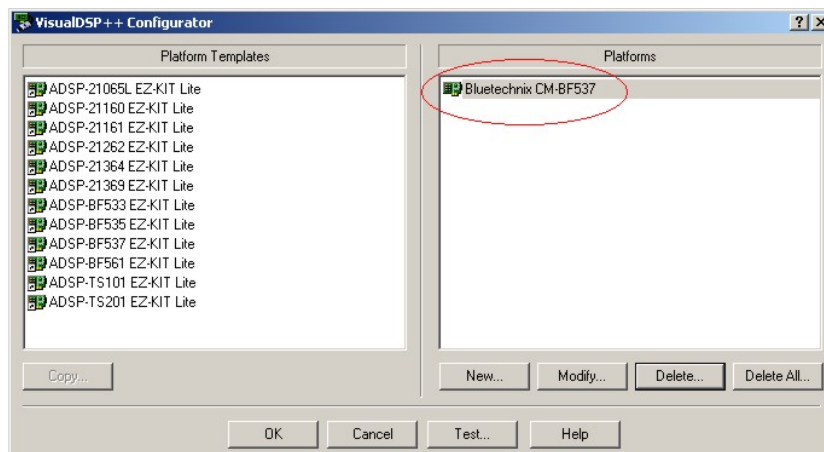
6. Press "Ok" to close the VisualDSP++ Configurator.

The last step is the creation of a VDSP++ debug session. Please follow the instructions below.

1. Open the "New Session Wizard" from the pulldown menu of the VDSP++ (Session→New Session) or press the "New Session" button on the "Sesson List" window that appears on startup of VDSP++.

2. Select the processor corresponding to your Core Module and press "Next".
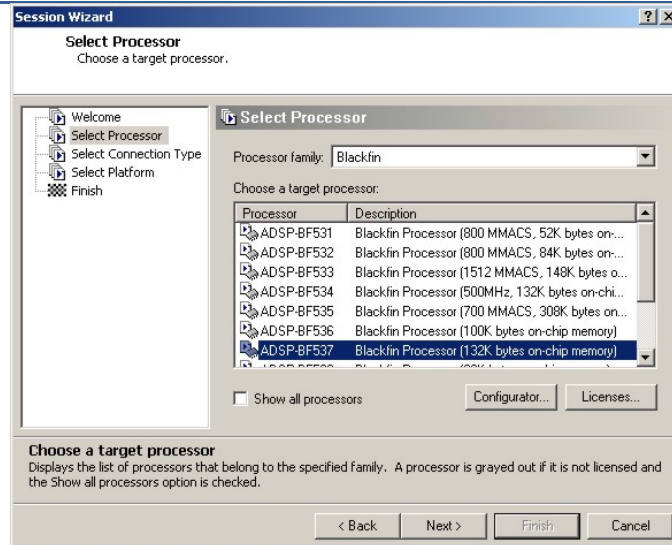
3. Select "EZ-KIT Lite" and press "Next".
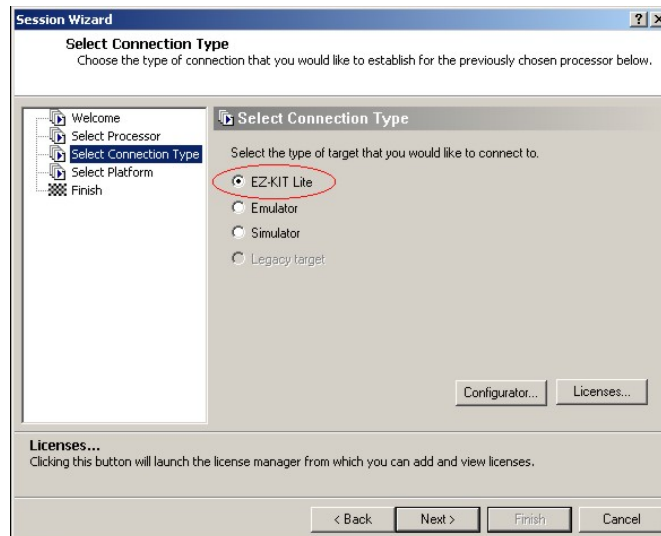
4. Select the platform that you have created with the VisualDSP++ Configurator and press "Finish".
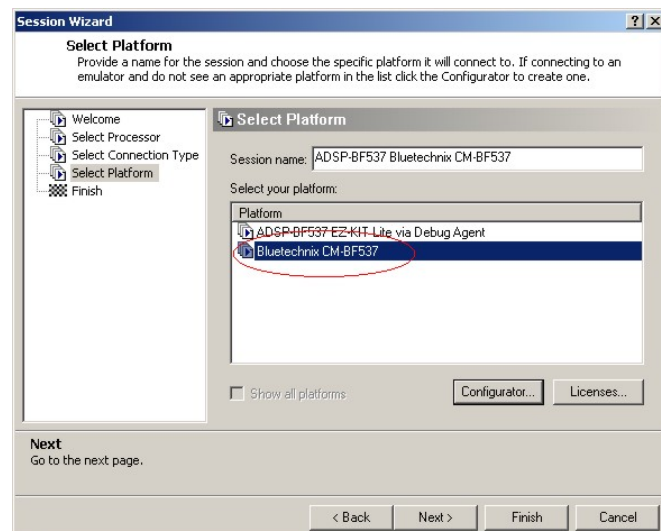
Now the session is ready and VDSP++ should start with these settings. The Core Module on the DEV-BF548DA-Lite is now ready for debugging.

For further information about the session wizard and the VDSP++ tools please refer to the VDSP++ manuals downloadable from the Analog Devices website.

If you change your Core Module on the DEV-BF548DA-Lite you have to reconfigure VDSP++ starting with the install tool as described above.

8 Using the VDSP Flash Programming Tool

8.1 Developing an Application

If you are developing your own projects with the VDSP++ development tools using the JTAG provided by Analog Devices you can use the flash programming tool included in the VDSP++ environment in order to flash your program on the Core Module. You have to load the flash driver located on your EVAL board support CD corresponding to the inserted Core Module.

8.2 Overwriting BLACKSheep Code

If you overwrite intentionally or unintentionally the section in the flash containing the BLACKSheep code, you need a JTAG device and the VDSP++ flash tool to reprogram the flash. Flashing the appropriate BLACKSheep loader file (*.ldr) located on the CD, reinstalls the BLACKSheep code.

The examples, drivers and the BLACKSheep software are under permanent development. Please refer to the download section of www.bluetechnix.com to get the latest versions or updates.

9 Extender Board Compatibility List

This chapter points out the compatibility of the DEV-BF548-Lite and DEV-BF548DA-Lite with Core Module and Extension Boards. Please refer to the Extender board and Core Module Hardware Manuals for further information.

Legend:

OK	Full functional
(OK)	Functional but not all features are available
NO	Not functional
NG	Functionality not guaranteed
NT	Not tested yet
Limited	Limited

The following tables show possible board combinations:

9.1 Without Extender Board

Core Module	CM-BF548	
No Extender	OK	

Table 9-1: Used without Extender Board

9.2 EXT-BF5xx-EXP

Core Module	CM-BF548	
EXT-BF5xx-EXP	NT	

Table 9-2: Used with the Experimental Extender Board

All boards can be used in combination with the Experimental Extender Board

9.3 EXT-BF5xx-Video

Core Module	CM-BF548	
EXT-BF5xx-Video	NT	

Table 9-3: Used with the Video Extender Board

9.4 Audio Extender Board

Core Module	CM-BF548	
EXT-BF5xx-Audio	NT	

Table 9-4: Used with the Audio Extender Board

9.5 Camera Extender Board

Core Module	CM-BF548	
EXT-BF5xx-Camera	NT	

Table 9-5: Used with the Camera Extender Board

9.6 Analog-Digital / Digital-Analog Converter Extender Board

Core Module	CM-BF548	
EXT-BF5xx-AD/DA	NT	

Table 9-6: Used with the Analog-Digital / Digital-Analog Converter Extender Board

9.7 USB-ETH Extender Board

Core Module	CM-BF548	
EXT-BF5xx-USB-ETH	NT	

Table 9-7: Used with the USB-ETH Extender Board

9.8 Video and Audio Extender Board

Core Module	CM-BF548	
EXT-BF5xx-Video	NT	
EXT-BF5xx-Audio	NT	

Table 9-8: Used with the Video and the Audio Extender Board

9.9 Camera and Audio Extender Board

Core Module	CM-BF548	
EXT-BF5xx-Camera	NT	
EXT-BF5xx-Audio	NT	

Table 9-9: Used with the Camera and the Audio Extender Board

10 Anomalies

2	Missing pull up resistor on nBR -> workaround done
1	Missing pull up resistor on CMD_OD -> workaround done

Table 10-1: Anomalies on V1.0 boards

11 Product Changes

Version	Changes
V1.1	Bug Fix and Connector Replacement
V1.0	Initial Board Version

Table 11-1: Product Changes

12 Document Revision History

Version	Date	Document Revision
11	2009-02-04	Caption for some tables added Table 5-1 corrected Table 6-1 S4.4-S4.1 added
10	2008-10-15	Chapter 4.9: column Pin No. (Symbol) added
9	2008-09-23	Extension Footprint added, Layout changed
8	2008-08-18	English checked for grammar, spelling and clarity.
7	2008-07-01	Change matching connector
6	2008-06-26	Fixed naming of dipwitches and added missing ones
5	2008-05-29	VDSP++ Version
4	2008-05-23	Several changes
3	2008-04-01	Extender Board Compatibility List
2	2007-12-10	Minor Changes
1	2007-12-09	Initial release of the document

Table 12-1: Revision History

A   List of Figures and Tables

Figures:

Tables: